The Mid Channel trend fold has increased in amplitude at 2 mm/yr since 200 ka over part of its length, the same rate as the vertical motions due to fault slip and folding since 1 Ma. Between 10 and 20 km west of the coastline, a shallow unconformity overlain by flatlying strata has a vertical separation of up to 20 m across the Oak Ridge fault and an additional few meters across a strand to the south (Fig. 6). This vertical separation logically accumulated since erosion ceased and aggradation commenced during the transgression following the last glacial maximum, after 18 ka. The post-1 Ma vertical separation due to faulting and folding in this area is about 1 km, and this suggests that Holocene vertical motions across the Oak Ridge fault are similar to the long -term rates.

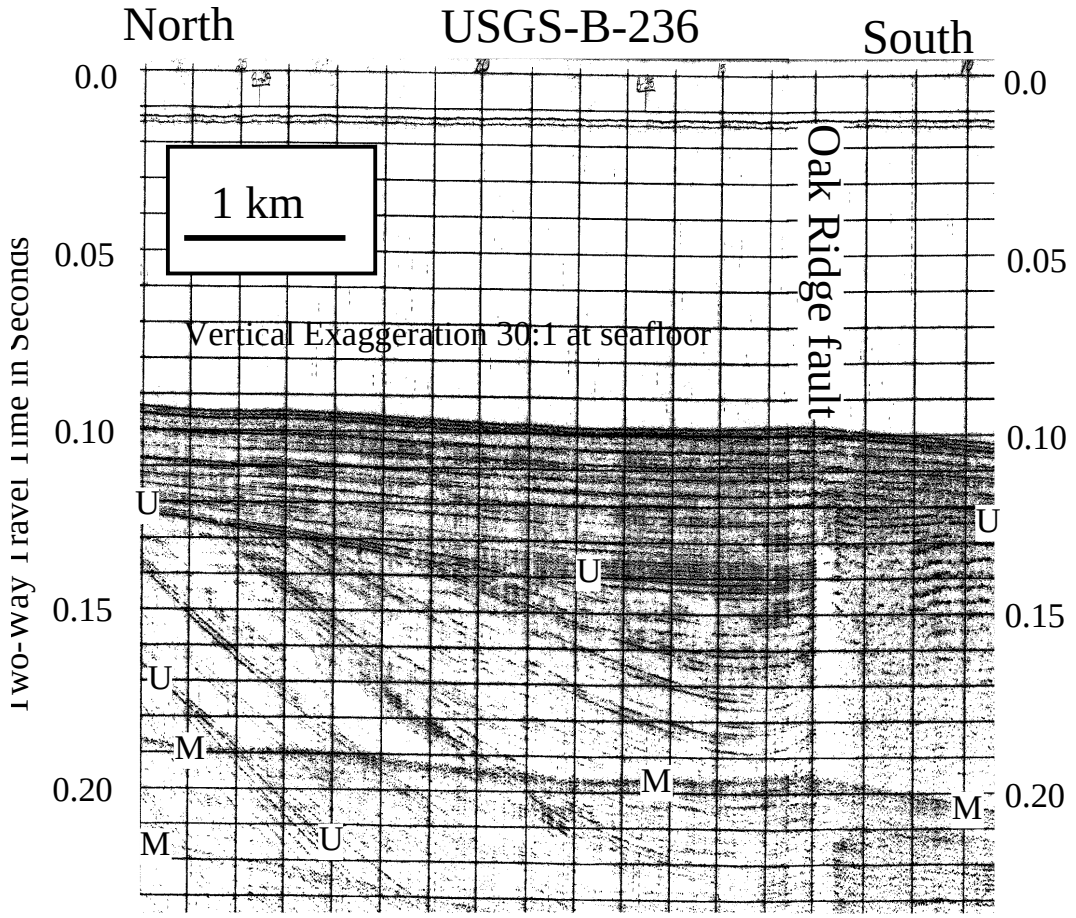

Figure 6: Part of the acoustipulse profile of B-236 from USGS data set 17200 (description and maps in Richmond and others, 1981). Vertical separation of an unconformity interpreted to represent the last glacial maximum is about 15 meters up to the south, with an additional 2-3 meters on a splay south of the figure. Vertical exaggeration has been doubled from the original for this figure.

About 10 km west of the coast, an oil well in block 361 (Fig. 1) drills through a listric Oak Ridge fault. Several wells and seismic reflection data show that fault slip resulted in at least 3 km of vertical separation of the 6 Ma top Monterey Formation. This slip is transformed into folding in the post-Miocene strata; the structure is a steeply-dipping fault-propagation fold similar to a trishear fold (e.g, Erslev, 1991). Throughout eastern Santa Barbara Channel, the shallower Pliocene and younger rocks are decoupled from the older rocks and folded into steep-flanked anticlines (Kamerling and Nicholson, 1996). Folding in the Pliocene section is decoupled from the more competent Miocene rocks across a south verging backthrust along much of the offshore Oakridge trend. The back thrust appears to slip along one or more lower Pliocene unconformities.